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Jay S. Hammond, Governor

Annual Performance Report for

STATUS OF IMPORTANT NATIVE CHINOOK SALMON STOCKS IN SOUTHEASTERN ALASKA

by

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STUDY AFS-41 A STUDY OF CHINOOK SALMON IN SOUTHEAST ALASKA
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Job No. AFS 41-7 Status of Important Native Chinook Salmon Stocks in Southeastern Alaska

RESEARCH PROJECT SEGMENT

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ABSTRACT

The chinook salmon, *Oncorhynchus tshawytscha* (Walbaum), research project was initiated in 1971 to determine the status of important chinook salmon stocks and methods of enhancing depleted populations in Southeastern Alaska.

Major emphasis during the last several years has been placed on determining migration routes and areas of harvest of Southeastern chinook through coded wire tagging and monitoring of chinook escapements.

The Taku Inlet drift gillnet fishery was monitored to determine the incidental catch of chinook salmon. An estimated 565 mature and 1,026 immature chinook were harvested.

Catches of incidentally caught immature chinook were greatly reduced by night closures in the District 106 drift gillnet fishery.

The enumerated escapement of 1,620 five- and six-year-old spring chinook salmon into the Nakina River, which is the major chinook spawning tributary of the Taku River, was the lowest escapement since 1972. This was caused by the very weak return of five-year-old chinook from the 1973 brood year.

Age class data collected on Taku chinook salmon during 1978 indicates that the 1979 run of six-year-old chinook (1.4) should be very weak, the return of five-year-olds (1.3) fairly strong, and the return of four-year-old jacks (1.2) very strong. At present, it appears that the 1980 spawning run into the Taku of three and four ocean chinook (five- and six-year-olds) should be very strong.

Escapement information on chinook salmon in the Stikine, Unuk, Chickamin, Situk, Keta, Blossom and King Salmon rivers is presented.

During 1978 a total of 48,666 chinook salmon smolts and rearing juveniles were captured in various tributaries of the Taku River and coded wire tagged, and 9,326 were captured and tagged on the Stikine River.

A preliminary survey indicated that sufficient juvenile chinook are available for future coded wire tagging in the Unuk River.

Recommendations for management include the following: discontinue the minimum size restriction on sport caught chinook near major chinook systems from May 1 to June 30, continue restrictive regulations designed to protect maturing native chinook, and continue to monitor drift gillnet fisheries throughout Southeastern to determine the catch of incidentally caught immature chinook.

Research recommendations include continued coded wire tagging and recovery of native juvenile spring chinook, monitoring of escapements, and determination of effects of catch and release in fresh water.

BACKGROUND

Spring run chinook salmon stocks are at a low level along much of the Pacific Coast. In some areas declining population levels are partially associated with losses of habitat. Examples of such habitat loss include the impounding or damming of flow on the Columbia and Sacramento rivers which has destroyed both spawning areas and rearing habitat for juveniles.

Although most chinook salmon river systems to the north of the Columbia have not suffered from losses of habitat or water quality, the stocks of chinook have declined. We believe the major reason for their decline is overharvest. The chinook salmon is the only salmon species which is available to sport and commercial troll fisheries for up to three or four years and, in addition, is often subjected to net fisheries near their river of origin.

In an attempt to rebuild depleted Southeast Alaska spring chinook stocks, gillnet fisheries which have operated near or in the mouths of the Alsek, Taku and Stikine rivers have been eliminated or severely restricted to protect returning spawning runs. In many areas sport and commercial troll closures or reductions in bag limits have also been made to protect maturing native chinook.

Although these closures and restrictions imposed on some of our terminal fisheries have increased escapements, further restrictions on harvest of immature chinook may be needed to rebuild stocks. Coded wire tagging of important Southeast chinook stocks will permit us to follow the migratory routes of various stocks during marine rearing and thereby determine areas of exploitation.

Table 1 lists the scientific and common names of all species mentioned in this report. The Taku and Stikine river drainages are illustrated in Figures 1 and 2.

Table 1. List of common names, scientific names and abbreviations.

Common Name	Scientific Name & Author	Abbreviation
Chinook salmon	*Oncorhynchus tshawytscha* (Walbaum)	KS
Coho salmon	*Oncorhynchus kisutch* (Walbaum)	SS
Sockeye salmon	*Oncorhynchus nerka* (Walbaum)	RS
Dolly Varden	*Salvelinus malma* (Walbaum)	DV
Cutthroat trout	*Salmo clarki* Richardson	CT

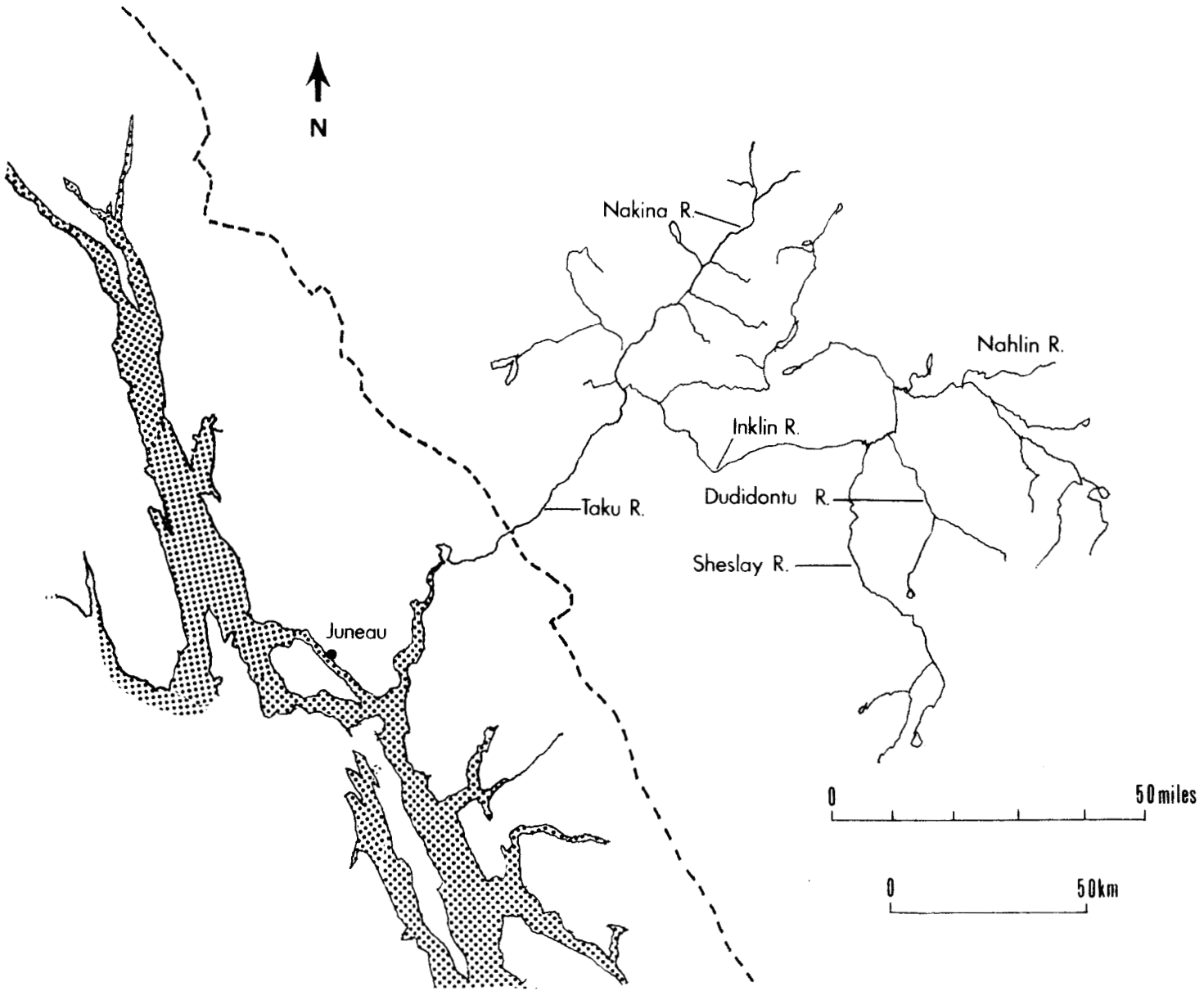

Figure 1. Taku River Drainage

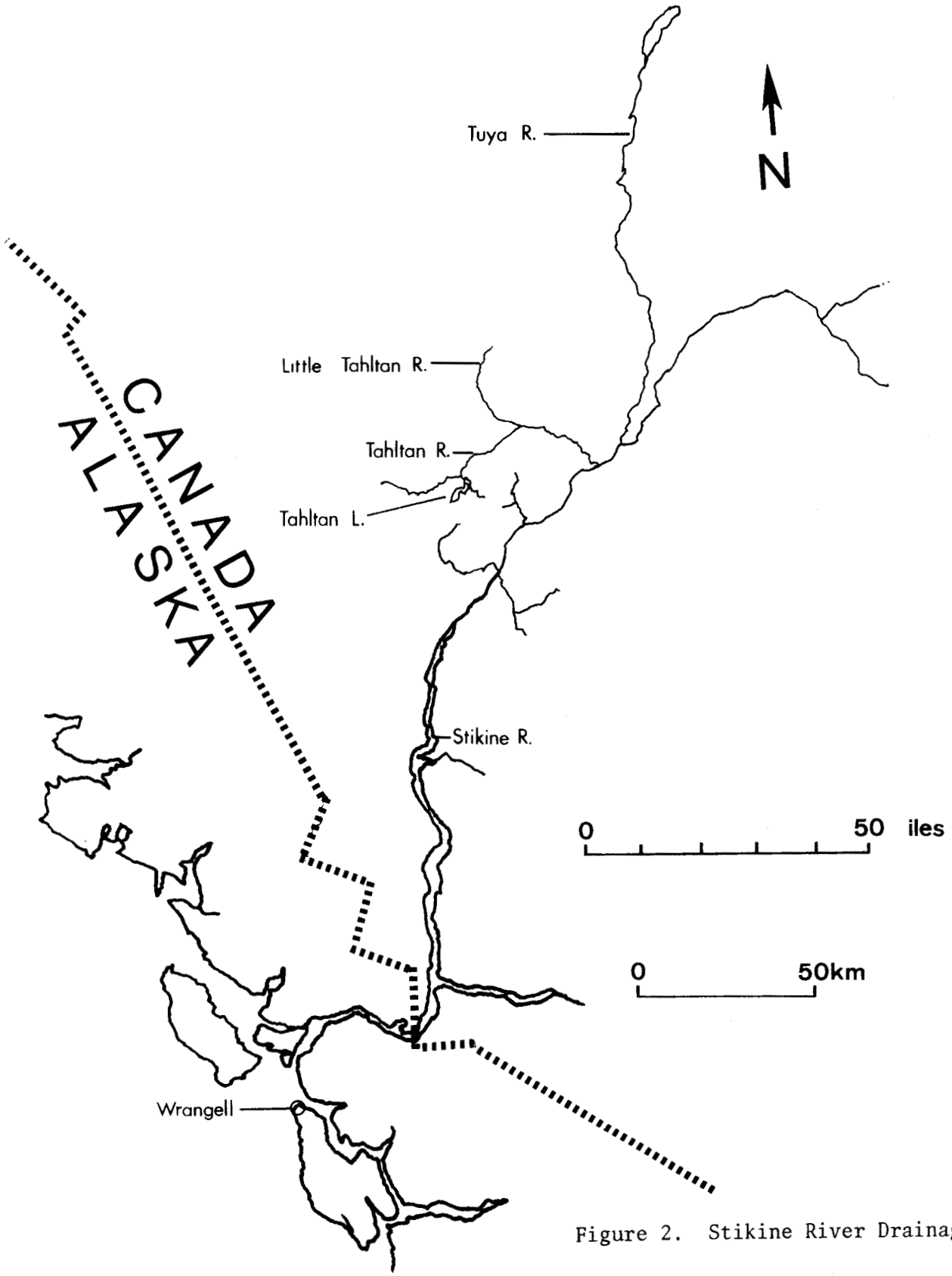

Figure 2. Stikine River Drainage

RECOMMENDATIONS

Management

1. Areas near the mouths of the Taku and Stikine rivers should have no minimum size on sport caught chinook salmon harvested from May 1 through June 30. Large numbers of precocious males returning to spawn are available and could be harvested without damaging the spawning run.

2. Restrictive regulations designed to protect maturing chinook salmon stocks near their rivers of origin should be continued. Southeast chinook stocks are still at a low level and continued restrictions are necessary to rebuild the stocks.

3. Drift gillnet fisheries throughout Southeastern Alaska should be monitored to ensure that large numbers of immature chinook are not being harvested incidentally to the target species. Night closures should be made in areas with high incidental catches of chinook.

Research

1. Coded wire tagging of juvenile chinook salmon should be conducted on the Taku, Stikine and Unuk rivers.

2. Sampling of chinook salmon throughout Southeastern Alaska should begin during July, 1979, as chinook smolts tagged during 1975 will have reached legal size 711 mm TL (28 in). Recovery of coded wire tags will permit us to determine marine migration patterns and areas of harvest at various life history stages of important native chinook stocks.

3. The effect on spawning success of capturing and releasing prespawning and spawning chinook salmon on commonly used sport gear in the Nakina River should be determined because of reports that individuals are catching and releasing up to 60 per day.

4. Escapement of chinook salmon in the major and medium sized chinook salmon spawning systems in Southeast should be monitored by aerial, ground and weir enumeration.

OBJECTIVES

1. Determine the catch and escapement of Taku River chinook salmon.

2. Determine if a delayed release of native Taku chinook smolts will result in the fish remaining in the local Juneau area.

3. Determine the catch and escapement of Stikine River chinook salmon.

4. Determine the feasibility of capturing sufficient numbers of chinook smolt or rearing juveniles in the Chickamin or Unuk rivers for a coded wire tagging program.

5. Determine the escapement of Chickamin and Unuk River chinook salmon.

6. Determine the escapement of chinook salmon in other important spawning rivers of Southeast Alaska.

TECHNIQUES USED

Commercial chinook salmon harvest data were taken from statistical runs which were compiled from individual fish tickets. Mid-eye to fork of tail measurements were taken from chinook salmon sampled in the gill net fisheries and on the spawning grounds.

During August, 1978, a tripod weir was operated on the Nakina River approximately 137 m (150 yd) above the junction with the Silver Salmon River. Chinook spawning above the weir were enumerated after they could no longer maintain station in the river and floated against the weir face. The structure was cleaned of carcasses at 10 a.m. and 7 p.m. daily. All species were enumerated, and length data, scale samples and sex determination were collected from the chinook.

Upriver surveys of both banks of the river were conducted every other day to enumerate and sample spawned-out chinook which had not floated downriver to the weir. The survey area extended approximately 2.4 km (1.5 mi) above the weir.

All escapement surveys were conducted by foot or by "Aloutte II", "Huges 500" or "Hiller 12E" helicopters. Only three- and four-ocean chinook (660 mm or 26 in total length or larger) were enumerated during aerial and foot surveys.

Gee minnow traps baited with salmon roe were used exclusively to capture rearing salmonidae.

Chinook smolts and rearing juveniles were anesthetized with MS 222, marked by removal of the adipose fin, and micro-wire tagged with a Northwest Marine Technology, Inc. tag injector. The tagging unit was modified to function under remote conditions by conversion to a 24 volt battery system (Koerner, 1977).

The micro-wire tags were made of type 302 stainless steel wire and were .25 mm (.0098 in) in diameter and 1.0 mm (.0394 in) in length. A code, based on the binary system, was etched into the surface of the wire to identify the agency tagging and the specific treatment of the individual.

To obtain maximum retention of the micro-wire tags they must be implanted in the cartilaginous wedge in the fish's snout. Several fish were thus sampled daily to insure proper tag placement. The fish's skull was bisected by a vertical incision through the dorsal median plane to the oral cavity. The tag was then readily observed in the fish's snout. If the tag was improperly placed, adjustments in the depth of the head mold were made and several more fish checked to ensure proper placement.

The micro-wire tags were magnetized by dropping the tagged fish head first through a ring magnet into a bucket of water. The fish were then passed through a NMT field sampling detector to check for the presence of a magnetized tag.

Samples of chinook smolts and rearing juveniles were collected for age and growth determinations. Fish were measured from the tip of the snout to the fork of the tail to the nearest millimeter and several scales were taken from the preferred area at the posterior edge of the dorsal fin, two rows above the lateral line.

To determine the age of chinook harvested in various sport and commercial fisheries in Southeast, and on the spawning grounds, scales were collected. Scales were taken in the preferred area, two rows above the laterial line and slightly posterior to the insertion of the dorsal fin. Because of the high occurrence of regeneration in chinook scales, five extra scales were taken from each side of each fish near the preferred area and placed in a numbered coin envelope.

Scales were later examined under a binocular microscope and the first complete scale was soaked in detergent, cleaned, and mounted on a numbered gum card. They were pressed in cellulose acetate and analyzed under an Eberback micro-projector at the magnification of 80 X.

FINDINGS

Taku River Studies

Drift Gillnet Fishery in Taku Inlet:

The spring drift gillnet fishery was again closed in 1978 as during the past two years to protect maturing Taku River spring chinook salmon. The drift gillnet fishery now opens on the third Monday in June and 137 mm to 140 mm (5 3/8 in to 5 1/2 in) stretched measure nylon mesh gillnets are utilized to harvest primarily sockeye salmon.

Concern for the high incidental harvest of immature chinook salmon during the 1973 "sockeye salmon" fishery led to the annual monitoring of the Taku Inlet drift gillnet fishery (Kissner, 1973-1978). From discussions with gillnet fishermen it was the consensus of opinion that the majority of the incidental take occurred during hours of darkness (Kissner, 1977).

Apportioning preliminary catch figures indicates that 565 maturing chinook and 1,026 immature chinook were harvested in the Taku gillnet fishery during 1978.

An opportunity to test the effect of daylight openings only, to protect immature chinook occurred during the 1978 fishing season in District 106 (Table 2). During the fishing period of June 26-27 indications were that a large number of immature chinook were in the area. During the next three fishing periods night fishing was prohibited and the incidental harvest was greatly reduced. Overnight fishing occurred again on July 24-25 and 1,162 incidentally caught chinook salmon were taken. The harvest dropped dramatically during the next two fishing periods, which had daylight openings only. The incidental harvest again rose during August 14-17 when night fishing was again permitted.

It appears that all drift gillnet fisheries in Southeast should be closely monitored to determine if large harvests of immature chinook are occurring and in cases with high catches, fishing should be permitted only during daylight hours.

Escapement:

The 1978 escapement of 1,620 three and four ocean chinook salmon into the Nakina River was the lowest observed since 1972 (Table 3). This was caused by the very weak return of three ocean spawners (Tables 4 and 5), which was predicted last year (Kissner, 1978), based on the weak return of three-year-olds (1.1) at the Nakina carcass weir in 1976 and four-year-olds (1.2) in 1977.

The number of spawned-out adult chinook enumerated at the Nakina carcass weir in 1978 was correspondingly low, but returns of one and two ocean precocious males was excellent (Tables 6 and 7).

Based on age class data collected at the carcass weir in 1978, the 1979 escapement of six-year-old chinook (1.4) should be very weak, the return of five-year-olds (1.3) fairly strong, and the return of four-year-old jacks (1.2) very strong.

At present, it appears that the 1980 spawning run of three and four ocean chinook (five and six-year-olds) should be very strong.

During recovery of chinook carcasses at and above the Nakina weir, 15 three-year-old (1.1) adipose clipped precocious males were observed and sampled. These fish had been tagged as smolts during April and May, 1977, near the mouth of Taku River. A total of 5,294 were tagged with code 5-8 between April 20 and May 11 and 4,555 with code 5-9 between May 12, and May 29. Of the 15 chinook recovered without adipose fins, 11 had micro-wire tags in their snout, two had no tags and two were recovered minus their heads, which had been eaten by predators. Of the 11 micro-wire tags, five recoveries of each code were made and one tag was lost between the field and lab (Table 8).

Table 2. Incidental catch of chinook salmon in the district 6 gillnet fishery, 1978.

DATE	BOATS	HOURS FISHED	CHINOOK	REMARKS
June 19-20	6	24	34	Daylight - Night
June 26-27	16	24	200	Daylight - Night
July 3-7	30	30	6	Daylight
July 10-12	53	45	29	Daylight
July 17-18	101	30	9	Daylight
July 24-25	81	24	1,162	Daylight - Night
July 31 - Aug. 2	68	45	15	Daylight
Aug. 7-8	86	30	9	Daylight
Aug. 14-17	120	72	831	Daylight - Night
Aug. 21-23	57	48	288	Daylight - Night
Aug. 28-31	47	72	54	Daylight - Night

Table 3. Escapement of chinook salmon into the Nakina River.

Date	Total Chinook (Excludes Jacks)
1951	5,000
1952	9,000
1953	7,500
1954	6,000
1955	3,000
1956	1,380
1957	1,500*
1958	2,500*
1959	4,000*
1960	Poor
1961	Poor
1965	3,050
1972	1,000
1973	2,000
1974	1,800
1975	1,800
1976	3,000**
1977	3,850
1978	1,620

* Counts of total river not conducted--comparison made from carcass weir enumeration.

** Carcass weir moved about five miles downriver because of Village Falls Barrier.

Table 4. Length frequency by age of female chinook salmon sampled at the Nakina carcass weir, 1978.

(MEFT - mm)	Age 1.3	Age 1.4	Age 1.5
675 - 699	1		
700 - 724	6		
725 - 749	1		
750 - 774	7	1	
775 - 799	6	7	
800 - 824	8	19	1
825 - 849	4	20	2
850 - 874	1	35	
875 - 899	2	38	1
900 - 924		31	2
925 - 949		10	1
950 - 974		2	
975 - 999		1	
TOTALS	36	164	7

Table 5. Length frequency by age of male chinook salmon sampled at the Nakina carcass weir, 1978.

(MEFT - mm)	1.1	1.2	1.3	1.4	1.5
250 - 274	1				
275 - 299	36				
300 - 324	462				
325 - 349	853				
350 - 374	616				
375 - 399	228	11			
400 - 424	74	12			
425 - 449	5	31			
450 - 474	2	61			
475 - 499		100			
500 - 524		150			
525 - 549		159	3		
550 - 574		144	3		
575 - 599		95	2		
600 - 624		100	2		
625 - 649		31	2		
650 - 674		16	2		
675 - 699		4	10		
700 - 724		1	7		
725 - 749			9		
750 - 774			9	1	
775 - 799			2	2	
800 - 824			1	3	1
825 - 849			2	7	1
850 - 874				13	
875 - 899			1	9	
900 - 924				10	1
925 - 949			1	18	1
950 - 974				9	
975 - 999				11	
1000 -1024				4	3
1025 -1049				1	1
TOTALS	2,277	915	56	88	8

Table 6. Total chinook enumerated by sex at the Nakina carcass weir and upriver.

Year	Female	Male	Total	Sex Ratio
1956	424	2,353	2,777	1: 5.55
1957	403	2,327	2,730	1: 5.77
1958	644	4,423	5,067	1: 6.87
1959	1,202	2,890	4,092	1: 2.40
1973	617	1,713	2,330	1: 2.78
1974	420	1,842	2,262	1: 4.39
1975	69	887	956	1:12.86
1976*	418	889	1,307	1: 2.13
1977	1,144	2,240	3,384	1: 1.96
1978	207	3,344	3,551	1:16.15

* Partial weir at Grizzly Bar.

Table 7. Number and age of male and female chinook salmon sampled at the Nakina carcass weir, by year.

MALE

Age	1956	1957	1958	1959	1973	1974	1975	1976*	1977	1978
1.1	754	699	1,335	838	336	730	228	64	1,145	2,277
1.2	1,201	1,249	2,404	1,132	853	718	505	412	434	915
1.3	312	242	561	611	273	267	90	236	283	56
1.4	86	110	123	298	242	124	63	95	368	88
1.5	0	0	0	0	7	3	1	4	7	8
n	2,353	2,300	4,423	2,879	1,711	1,842	887	811	2,237	3,344

FEMALE

Age	1956	1957	1958	1959	1973	1974	1975	1976*	1977	1978
1.2	8	0	0	3	0	0	0	0	0	0
1.3	287	274	469	778	210	197	38	206	298	36
1.4	129	122	175	410	404	223	31	179	834	164
1.5	0	0	0	0	0	0	0	0	11	7
n	424	396	644	1,191	614	420	69	385	1,143	207

* Partial weir at Grizzly Bar.

Table 8. Juvenile chinook salmon coded wire tagging - recovery information, 1978.

Date	Area	Brood	Age	Data Code	Origin	Mid-eye Fork Length
July 27	Nakina weir	1975	1.1	5-9	Mainstem Taku	330 mm
Aug. 4	Nakina weir	1975	1.1	5-9	Mainstem Taku	310 mm
Aug. 6	Nakina weir	1975	1.1	adipose clip no tag	Mainstem Taku	335 mm
Aug. 23	Nakina weir	1975	1.1	5-8	Mainstem Taku	355 mm
Aug. 15	Nakina weir	1975	1.1	5-9	Mainstem Taku	335 mm
Aug. 15	Nakina weir	1975	1.1	5-8	Mainstem Taku	410 mm
Aug. 24	Nakina weir	1975	1.1	envelope had hole--tag lost	Mainstem Taku	380 mm
Aug. 20	Nakina weir	1975	1.1	5-9	Mainstem Taku	330 mm
Aug. 18	Nakina weir	1975	1.1	5-8	Mainstem Taku	295 mm
Aug. 10	Nakina weir	1975	1.1	5-8	Mainstem Taku	360 mm
Aug. 13	Nakina weir	1975	1.1	5-8	Mainstem Taku	330 mm
Aug. 16	Nakina weir	1975	1.1	5-9	Mainstem Taku	310 mm
Aug. 10	Nakina weir	1975	1.1	adipose clip no tag	Mainstem Taku	355 mm
Aug. 10	Nakina weir	1975	1.1	no head + adipose clip	Mainstem Taku	. . .
Aug. 12	Nakina weir	1975	1.1	no head + adipose clip	Mainstem Taku	. . .

The first ocean recoveries of micro-wire tagged chinook salmon of Southeast origin should be during the summer of 1979 when the Taku River smolts tagged during April and May of 1977, reach the 711 mm total length (28 in) minimum size.

Peak escapement estimates of other chinook salmon spawning tributaries monitored annually on the Taku River is presented in Table 9.

Effect of Catch and Release on Prespawning and Spawning Chinook Salmon:

The sport fishing pressure on chinook salmon in the Nakina River is increasing annually. Recent reports have been received that up to 60 chinook per day are being caught and released. In an attempt to determine the effect on spawning success of capturing and releasing prespawning and spawning chinook salmon on commonly used sport gear a study was planned for 1978. Prespawning and spawning chinook were to be captured and released above the Nakina carcass weir, utilizing similar techniques used down river at the sport fish camps. Captured fish would be marked by removal of the adipose fin. Comparisons of spawning success could then be made between marked and unmarked chinook recovered at the Nakina carcass weir, and during upriver surveys.

Problems were encountered with the status of the land the Department of Fish and Game cabin was built on, and by the time the problem was negotiated it was too late to conduct the proposed study. It is recommended that the study be conducted during June and July of 1979.

Juvenile Chinook Studies:

In an attempt to increase the efficiency and catch of chinook salmon smolts in minnow traps during the 1978 spring out-migration, capturing and tagging activities were conducted about 16.1 km (10 mi) upriver from the 1977 spring operation (Kissner, 1978). In this upper area more cover and log jams are available.

Initial minnow trapping which was conducted during April 3 and 4 by helicopter, indicated that the good numbers of rearing chinook observed on the King Salmon Flats during the fall apparently had moved from the area. Good catches were made from the vicinity of Tulsequah to the edge of the "Flats".

A field camp was established at George Bacon's Cabin at Tulsequah on April 11 and trapping continued until May 15. During the first week of operation, while the water was low and clear, nearly 50% of the total catch was made. A total of 9,550 chinook smolts (Table 10) averaging 70.3 mm FL (2.77 in) (Table 11) were captured and tagged. An additional 1,958 coho smolts and juveniles were incidental caught and tagged.

In future years, operations should begin in the Tulsequah area as soon as the area is ice free. This requires that a boat be left over winter at Tulsequah, as the mouth of the river is usually the last area to

Table 9. Peak escapement of chinook salmon in the Taku River tributaries, 1951-1978.

Year	Nakina	Kowatua	Tatsamenie	Dudidontu	Tseta	Nahlin
1951	5,000	...	...	400	100	1,000
1952	9,000	...	...	...	...	...
1953	7,500	...	...	...	...	...
1954	6,000	...	...	...	...	...
1955	3,000	...	...	...	...	...
1956	1,380	...	...	...	...	...
1957	1,500	...	...	...	...	...
1958	2,500	...	...	4,500	...	2,500
1959	4,000	...	...	...	...	...
1960	Poor	...	...	...	...	...
1961	Poor	...	...	...	...	...
1962	...	...	...	25	81	216
1963	...	...	...	...	...	...
1964	...	...	...	...	...	...
1965	3,050	200 G	50 G	100	18	37
1966	...	14 G	150 G	267	150	300
1967	...	250 G	...	600	350	300
1968	...	1,100 E	800 E	640	230	450
1969	...	3,300 E	800 E	...	...	...
1970	...	1,200 E	530 E	10	25	26
1971	...	1,400 E	320 E	165	...	473
1972	1,000	130 G	170 G	103	80	280
1973	2,000	100 G	200 G	200	...	300
1974	1,800	235 G	120 G	20	4	900
1975	1,800	...	...	15	...	274
1976	3,000	341 G	620 E	40	...	725
1977	3,850	580 G	573 E	18	...	650
1978	1,620	490 G	550 E	...	21	624

G = water glacial
E = water clear

Table 10. Native chinook salmon juveniles and smolts tagged by brood year, code, and river system in Southeast Alaska during 1978.

RIVER	NUMBER	CODE	DATES	SIZE	BROOD YEAR
Mainstem Taku	4,778	17-21	April 13-21	70.3 mm	1976
Mainstem Taku	3,717	17-22	April 23-7	70.3 mm	1976
Mainstem Taku	666	17-23	May 9-11	70.3 mm	1976
Mainstem Taku	389	17-24	May 12-16	70.3 mm	1976
Mainstem Stikine	357	17-16	April 24 - May 18	73.9 mm	1976
Mainstem Stikine	420	17-17	April 24 - May 18	73.9 mm	1976
Mainstem Stikine	507	16-33	April 24 - May 18	73.9 mm	1976
Little Tahltan (Stikine)	5,223	17-20	Sept. 10-26	63.6 mm	1977
Little Tahltan (Stikine)	2,819	17-25	Sept. 11-14	63.6 mm	1977
Mainstem Taku	31,376	17-28	Sept. 23 - Nov. 3	63.9 mm	1977
Mainstem Taku	7,740	17-30	Sept. 23 - Nov. 3	63.9 mm	1977
	57,992				

Table 11. Length frequency in mm of chinook salmon smolt sampled on the Taku River during April - May, 1978.

Fork Length (mm)	n	Fork Length (mm)	n
50	1	74	38
51	0	75	36
52	1	76	39
53	3	77	10
54	5	78	35
55	5	79	15
56	6	80	19
57	5	81	10
58	11	82	11
59	19	83	11
60	31	84	12
61	30	85	13
62	40	86	5
63	27	87	2
64	49	88	5
65	43	89	2
66	44	90	6
67	38	91	4
68	56	92	4
69	48	93	2
70	49	94	0
71	52	95	2
72	38	96-106	5
73	34		

n = 921
$\bar{x}$ Length = 70.3 mm

break up in the spring. Capturing and tagging of chinook smolts should continue until the river level rises 0.91 or 1.22 m (3 or 4 ft) and the water becomes murky, usually around May 5-10.

Fall field operations to capture and micro-wire tag young-of-the-year chinook began on September 20 and were completed on November 4. The water remained low and relatively clear during September, and during the first 10 days over 26,000 chinook were captured and tagged. Heavy rains during the majority of October, with associated high and muddy water, caused catches to decline; during October and early November only about 13,000 juvenile chinook were tagged. A summary of tagged chinook by code, is presented in Table 10. The chinook averaged 63.9 mm FL (2.52 in) (Table 12).

Fall trapping for juvenile chinook is much more efficient than trapping smolts in the spring; however, tagging in both the spring and fall using separate codes will permit us to estimate overwinter freshwater mortality.

Effect of Delayed Release on Migration of Native Taku River Chinook Smolts:

Because less than 50,000 chinook smolts were captured and tagged on Taku River during April and May, the experiment on effect of delayed release on migration was not completed.

Stikine River Studies

Drift Gillnet Fishery in the Stikine River:

The spring drift gillnet fishery for chinook salmon which operates near the mouth of the Stikine River was closed during 1978 by the Alaska Board of Fisheries to attempt to rebuild this depleted chinook run.

Escapement:

Past interviews with Tahltan informants indicated that the Tahltan River system was the major chinook salmon spawning tributary of the Stikine River and a survey by helicopter during 1975 confirmed the importance of the Tahltan system (Kissner, 1976).

The Stikine River chinook escapement was better than anticipated as a large landslide blocked access in 1965 and 1966 into the Tahltan River. In 1966 only 318 chinook were airlifted over the barrier, and 1978 was the second cycle return from the 1966 escapement. During the peak of spawning 632 chinook were observed in the Little Tahltan River (Table 13) and 756 in the glacial Tahltan River.

Juvenile Chinook Studies:

During May and November, 1977, attempts were made to determine habitat preference and number of juvenile chinook that could be captured by baited minnow traps for coded wire tagging. Results indicated that the

Table 12. Length frequency in mm of young-of-the-year chinook salmon sampled on the mainstem Taku River during October, 1978.

Fork Length (mm)	n	Fork Length (mm)	n	Fork Length (mm)	n
48	1	71	23	94	1
49	2	72	16	95	0
50	5	73	22	96	1
51	8	74	17		
52	11	75	22	n = 966	
53	23	76	8	$\bar{x}$ Length = 63.9 mm	
54	34	77	8		
55	46	78	9		
56	47	79	11		
57	38	80	12		
58	50	81	8		
59	73	82	8		
60	62	83	7		
61	57	84	4		
62	49	85	4		
63	44	86	5		
64	43	87	3		
65	48	88	1		
66	25	89	4		
67	22	90	3		
68	33	91	1		
69	27	92	0		
70	19	93	1		

Table 13. Peak escapement estimates of chinook salmon in the Tahltan and Little Tahltan rivers.

LITTLE TAHLTAN RIVER

Year	Date	Chinook	Remarks
1956	August 11	334 jacks 493 adults	Hyland Ranch to Tahltan River
1957	July 21	199	Too early--fish schooled
1958	August 6	790	3/4 mile below Hyland to 1 1/2 miles below Saloon
1959	August 7	198	Fish in poor condition--survey too late
1960	August 5	346	1/4 mile below Hyland Ranch to a mile or two below Saloon
1967		800	Canadian survey
1975	August 13	700	Many spawned-out
1976	August 7	400	Conditions fair
1977	July 30	800	Peak spawning
1978	July 26	632	Mostly schooled

MAINSTEM TAHLTAN RIVER

Year	Date	Chinook	Remarks
1975	August 13	2,908	Clear
1976	August 20	120	Late
1977	July 30 + August 18	0	Glacial
1978	August 8	756	Glacial

lower mainstem Stikine did not appear to be a major rearing area for juvenile chinook because of lack of cover, few log jams, and a bottom composed mainly of mud and silt (Kissner, 1978).

Efforts during 1978 were thus directed at capturing downstream migrating chinook smolts in the mainstem and investigation of areas of concentrations of rearing juveniles in the headwaters.

During April 18 through May 18 daily capturing and coded wire tagging of chinook and coho salmon was conducted on the mainstem Stikine between the U.S.-Canadian border and a point approximately 3.2 km (2 mi) above the Iskut River and on the Lower Iskut and Katete rivers.

Approximately 100 traps were dispersed in this area and checked and rebaited daily. As water levels fluctuated almost daily, traps were moved to take advantage of eddies and other types of habitat more likely to hold fish. Catch per trap of both chinook and coho was extremely low and during the 1-month period only 666 chinook smolts averaging 73.9 mm FL (2.91 in) (Table 14), and 3,785 juvenile coho were tagged. An additional 507 chinook smolts were tagged near the mouth of the Stikine River by the Coho Tagging Project.

Because of the poor success in capturing chinook smolts in the lower river a preliminary survey was conducted on July 25-26 to trap several of the headwater spawning tributaries. Minnow traps were dispersed via helicopter on the Chutine, Tahltan and Little Tahltan rivers and soaked overnight. Juvenile chinook were captured in all three tributaries (Table 15) but the highest densities were observed in the Little Tahltan River, where 472 chinook were captured in eight minnow traps.

Minnow trapping conducted on August 31 indicated that the juvenile chinook were still in the Little Tahltan in numbers sufficient for a coded wire tagging program.

A five person crew captured and tagged 8,042 young-of-the-year chinook averaging 63.6 mm (2.5 in) during September 5-15 on the Little Tahltan River (Table 16). The number of chinook captured by baited minnow traps was lower than anticipated; however, a weir which was fished for five nights indicated that a downstream migration of juveniles was in progress (Table 17). A difference of nearly 10 mm (.39 in) in average size was noted between fish sampled at the weir and in minnow traps (Table 18).

Limited seining conducted during May, 1978 indicated the possibility of capturing numbers of juveniles in the mainstem for coded wire tagging, thus next years' efforts should be aimed at seining in the mainstem and capturing juveniles in the smaller tributaries by minnow trap and seine.

Juvenile Chinook Studies on the Unuk and Chickamin Rivers

To determine the feasibility of capturing large numbers of juvenile chinook for coded wire tagging, minnow trapping was conducted by helicopter on the Unuk River and several of its clearwater tributaries. Extremely

Table 14. Length frequency in mm of chinook salmon smolts sampled on the Stikine River during May, 1978.

Fork Length (mm)	n	Fork Length (mm)	n
56 or less	6	79	19
57	1	80	27
58	5	81	39
59	2	82	25
60	8	83	19
61	13	84	16
62	10	85	10
63	27	86	14
64	29	87	2
65	30	88	6
66	27	89	5
67	14	90	8
68	34	91	11
69	23	92	11
70	27	93	3
71	42	94-99	5
72	36		
73	40	Total sampled = 750	
74	49		
75	38	$\bar{x}$ Length = 73.9 mm	
76	31		
77	20		
78	18		

Table 15. Juvenile chinook salmon captured by baited minnow traps on the Chutine, Tahltan and Little Tahltan rivers, July 25-26, 1978.

RIVER	TRAPS	CATCH
Chutine - just below Pendant Creek	5	10 chinook, 5 coho
Chutine - just below Triumph Creek	5	13 chinook, 1 coho
Chutine - two miles below Chutine Lake	5	many Dolly Varden
Mainstem Tahltan - near Bear Creek	4	22 chinook
Mainstem Tahltan - near Beatty Creek	4	4 chinook
Little Tahltan - Salon area	8	472 chinook

Chinook $\bar{x}$ length = 55.9 mm F.L.

n = 48

Table 16. Number of minnow traps checked and chinook tagged and released after capture by minnow traps and at weir, Little Tahltan River, 1978.

DATE	MINNOW TRAPS CHECKED	MINNOW TRAP TAGGED AND RELEASED	WEIR TAGGED AND RELEASED	CODE
Sept. 6	79	...	...	...
Sept. 7	111	1,403	148	17-20
Sept. 8	119	806	331	17-20
Sept. 9	119	1,101	247	17-20
Sept. 10	122	...	297	17-20
Sept. 11	...	767	123	17-20
Sept. 11	107	473	...	17-25
Sept. 12	114	885	...	17-25
Sept. 13	98	837	...	17-25
Sept. 14	98	624	...	17-25

Table 17. Juvenile chinook salmon captured at the Little Tahltan River temporary weir, 1978.

DATE	CHINOOK ENUMERATED
September 7	227
September 8	353
September 9	276
September 10	305
September 11	246

Table 18. Length frequency in mm of young-of-the-year chinook salmon sampled on the Little Tahltan River during September, 1978.

Fork Length (mm)	Weir n	Minnow Trap n	Fork Length	Weir n	Minnow Trap n
48 or less	0	16	71	6	10
49	1	9	72	8	15
50	0	9	73	11	4
51	0	12	74	5	4
52	0	10	75	3	11
53	1	12	76	7	5
54	2	14	77	13	4
55	2	26	78	12	3
56	2	20	79	7	6
57	0	24	80	8	5
58	5	29	81	9	2
59	7	23	82	3	3
60	2	24	83	5	1
61	5	19	84	0	1
62	8	25	85	3	2
63	5	26	86	0	2
64	0	10	87	0	0
65	6	17	88	1	0
66	8	14	89	0	0
67	9	17	90	1	0
68	8	21	91	0	0
69	2	14	92	1	0
70	2	8	98	1	0
			TOTAL SAMPLED	179	477
			$\bar{x}$ Length = 71.5 mm		62.0 mm

high water during October and early November and a cold snap which froze the river shortly thereafter caused the survey to be postponed until December 1.

Even with water temperatures of 0.6-1.1°C (33-34°F) minnow traps indicated that good numbers of juvenile chinook were rearing in the mainstem Unuk (Table 19). Trap catches in the clearwater tributaries were very poor.

Minnow trapping and coded wire tagging of juvenile chinook should be conducted during October, 1979, on the Unuk River.

Minnow trapping was not conducted on the Chickamin River as planned, as the short daylight hours in early December did not permit trapping both the Unuk and Chickamin rivers during the same time period. Because of very low escapements into the Chickamin during the last several years it appears that few juveniles would be captured, and it is recommended that efforts be concentrated on the Unuk system.

Escapement in Other Areas of Southeast Alaska

A summary of escapement enumeration in chinook salmon systems monitored annually is presented in Table 20.

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Table 19. Minnow trap catches of chinook, coho, Dolly Varden and culthroat on the Unuk River, December 1-2, 1978.

1. Set two miles up on mainstem - 10 traps
   30 chinook 49 coho 47 D.V. 3 C.T.

2. Bend - three miles up - 6 traps
   37 chinook 13 coho 38 D.V.

3. Clear Creek - 7 traps
   3 chinook 40 coho 10 D.V.

4. Genes Lake Creek - 34°F - 6 traps
   1 chinook 240 coho 75 D.V.

5. Cripple Creek - 35°F - 7 traps (lower, below trees)
   19 chinook 175 coho 113 D.V.

6. Mainstem - near Lake Creek - 7 traps
   107 chinook 37 coho 77 D.V.

7. Two miles below Lake Creek on mainstem - 18 traps
   106 chinook - mostly in mainstem 185 coho 200 D.V. - side sloughs

8. Hulakon River - 7 traps - below forks
   7 chinook 222 coho 50 D.V.

Grand Totals: 310 chinook 961 coho 610 D.V. 3 C.T.

$\bar{x}$ Length (F.L.) chinook = 64.7 mm

n = 50

12-1-78 Water Temp. 34°F - Main Unuk

12-2-78 Water Temp. 33°F - Main Unuk

Table 20. Peak escapement estimates of chinook salmon in Southeast Alaska rivers, 1961 through 1978.

Unuk River

Year	Chinook	Method
1961	673	Foot
1962	331	Air
1963	1,070	Air
1968	650	Air
1969	475	Air
1972	885	Air
1973	182	Air
1975	55	Helicopter
1976	198	Helicopter
1977	1,166	Helicopter, Weir-foot
1978	1,765	Helicopter, Weir-foot

Chickamin River

Year	Chinook	Method
1961	336	Ground
1962	775	Air
1963	450	Air
1969	345	Air
1972	860	Air
1973	229	Helicopter
1974	176	Helicopter
1975	351	Helicopter
1976	122	Helicopter
1977	235	Helicopter
1978	181	Helicopter

King Salmon River (Admiralty Island)

1957	200	Foot
1961	117	Foot
1971	94	Foot
1972	90	Foot
1973	211	Foot
1974	104	Foot
1975	42	Foot
1976	65	Foot, Helicopter
1977	134	Foot, Helicopter
1978	57	Foot, Helicopter

Table 20. (cont.) Peak escapement estimates of chinook salmon in Southeast Alaska rivers, 1961 through 1978.

Wilson - Blossom River

Year	Chinook	Method
1961	68	Ground
1963	825	Air
1972	500	Air
1974	166	Helicopter
1975	153	Helicopter
1976	68	Helicopter
1977	112	Helicopter
1978	143	Helicopter

Keta River

Year	Chinook	Method
1948	500	Foot
1950	210	Foot
1951	120	Foot
1952	462	Foot
1953	156	Foot
1954	300	Air
1955	1,000*	Air
1956	1,500*	Air
1957	500*	Air
1961	44	Ground
1975	203	Helicopter
1976	84	Helicopter
1977	230	Helicopter
1978	392	Helicopter

Table 20. (cont.) Peak escapement estimates of chinook salmon in Southeast Alaska rivers, 1961 through 1978.

Situk River		
Year	Chinook	Method
1928	1,224	Weir
1929	3,559	Weir
1930	1,455	Weir
1931	2,967	Weir
1932	1,978	Weir
1933	...	...
1934	1,486	Weir
1935	638**	Weir
1936	816	Weir
1937	1,290**	Weir
1938	2,668**	Weir
1939	2,117	Weir
1940	903	Weir
1941	2,594	Weir
1942	2,543	Weir
1943	3,546**	Weir
1944	2,906	Weir
1945	1,458	Weir
1946	4,284	Weir
1947	5,077	Weir
1948	3,744	Weir
1949	1,978	Weir
1950	2,011	Weir
1951	2,780	Weir
1952	1,459	Weir
1953	1,040	Weir
1954	2,101	Weir
1955	1,571	Weir
1971	964	Weir
1972	400	Float
1973	510	Float
1974	702	Float
1975	1,180	Float
1976	1,933	Weir
1977	1,872	Weir
1978	1,103	Weir

* Probably chum salmon
** Weir out part of the time

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